



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/647,662	02/02/2001	Martin Topsoe	2954/0H643	1457

7590 09/09/2003  
S Peter Ludwig  
Darby & Darby  
805 Third Avenue  
New York, NY 10022-7513

EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 09/09/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/647,662	TOPSOE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 July 2003 .
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-16, 18, 20-25, 27 and 28 is/are allowed.
- 6) ☒ Claim(s) 17 is/are rejected.
- 7) ☒ Claim(s) 19 and 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_ .
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                               | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)           | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . | 6) <input type="checkbox"/> Other: _____ .                                   |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 7/29/03. Applicant's arguments have been considered, but are not persuasive. Claims 1-28 are pending. This Action is made **FINAL**, as necessitated by amendment.

#### ***Claim Objections***

Claim 19 is objected to because of the following informalities: in line 10 after "ethylacetate;" the claim should recite "and,". Appropriate correction is required.

Claim 26 is objected to because of the following informalities: it appears "lithium magnesium oxide" should be "lithium manganese oxide" (see previous claim 17). Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 17 is rejected under 35 U.S.C. 103(e) as being unpatentable over Kejha, US 5,705,084 in view of Kejha, US 6,080,511.

Kejha '084 teaches a polymer electrolyte for electrochemical devices. The polymer electrolyte is formed by heating a mixture of dimethyl carbonate, ethylene carbonate (solvent), lithium perchlorate (LiClO<sub>4</sub> salt), PVDF/HFP (polyvinylidene fluoride-hexafluoropropylene) copolymer and PEO (polyethylene oxide) to 90°C while stirring to dissolve the PVDF and PEO. The polymer mixture was then coated hot onto an oxide based electrode (incorporated into a

Art Unit: 1745

cell). The mixture was then cooled to 27°C to form a gelled electrolyte. See Example IV of Kejha '084 and Example 2 of Kejha '511. Kejha '511 is used as evidence that the method disclosed in Example IV of Kejha '084 results in a gelled electrolyte (semi-solid ion conductive layer). The methods of Example IV of Kejha '084 and Example 2 of Kejha '511 are identical. The weight percentages of the solvents, salts and polymers for Example IV are disclosed in col. 6, lines 1-9 (claim 7). The positive electrode is an oxide based electrode and the negative electrode is a lithiated carbon based electrode. As evidenced by Kejha '511, the oxide may be  $\text{LiCoO}_2$  and the carbon may be graphite (col. 2, lines 64-col. 3, lines 10).

Kejha '084 does not explicitly state that polymer mixture is heated to a first temperature to dissolve the polymer mixture and then to a second temperature prior to cooling to gel the polymer (method limitation).

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. Thus, whether the polymer mixture is heated to a first temperature and then to a second temperature (two steps), or just heated to the second temperature (one step), the product, as an end result, is the same. In re Fessman.

***Allowable Subject Matter***

Claims 1-16, 18, 20-25, 27 and 28 are allowed.

Claims 19 and 26 would be allowable if rewritten or amended to overcome the objections set forth in this Office action.

Art Unit: 1745

The following is a statement of reasons for the indication of allowable subject matter: the claims are directed toward a method of preparing a polymer electrolyte wherein an electrolyte precursor comprising solvent(s), salt(s) and a polymer is heated to a first temperature  $T_{\text{dissol}}$  and then incorporated into the electrochemical cell. After incorporation into the electrochemical cell, the cell is heated to a second temperature  $T_{\text{gel}}$ . The cell is subsequently cooled to ambient temperature to gel the polymer in the polymer electrolyte.  $T_{\text{dissol}}$  is lower than  $T_{\text{gel}}$ .

The prior art does not teach the method of instant claim 1. Note that when the precursor is incorporated into the electrochemical cell, the cell is interpreted as having an anode, a cathode and a separator. The claim does not encompass polymer electrolyte precursors that, for example, are applied to a single electrode before the cell is fabricated. The claim does not encompass polymer precursor mixtures that upon gelling perform the function of both separator and electrolyte. See the instant specification, page 10, which discloses “the electrolyte is applied on a wound cell, i.e. the winding of the cell is done prior to electrolyte impregnation” and “the electrolyte is filled into cell-laminates...separation arises because the gap between the electrode laminates is ...”. Also, the examples teach that the cell is wound before the electrolyte precursor is incorporated.

Hoshi et al., WO97/48106 teaches a hybrid electrolyte and method of preparing the hybrid electrolyte for an electrochemical device. The hybrid electrolyte contains solvent(s), salt(s) and a polymer. An example of a combination of polymer and solvent includes a combination carbonate solvent, such as ethylene carbonate and propylene carbonate, as a solvent for the electrolyte (salt) and a vinylidene fluoride polymer (i.e. polyvinylidene fluoride or a copolymer of vinylidene fluoride) as the polymer (page 13, paragraph [0055]). When the above

Art Unit: 1745

combination of a solvent and a polymer is employed, the impregnation is preferably conducted at a temperature of 35°C or less and the swelling is preferably conducted at the temperature of 80°C or more (page 13, paragraph [0055]). Hoshi does not teach incorporating the polymer electrolyte into a prefabricated electrochemical cell. See claims analysis above.

Kejha '084 teaches a single heating temperature (90°C) of the polymer electrolyte precursor before applying hot on a positive electrode. Kejha does not teach the  $T_{\text{dissol}}$  and  $T_{\text{gel}}$  of claim 1. Furthermore, Kejha teaches the precursor is cooled (gelled) before the anode is applied. Thus, the polymer electrolyte is gelled before the cell is fabricated.

Eschbach et al., US 5,681,357 teaches an electrochemical cell wherein a polymer electrolyte precursor is cured/gelled by placing the fabricated cell between heated plates, heated to a temperature of ~90°C. The cell is then quenched which converts the PVDF into a gel, fusing the anode, cathode and separator of the cell together. See Example 1. Eschbach does not teach the  $T_{\text{dissol}}$  and  $T_{\text{gel}}$  of claim 1. Furthermore, the polymer dissolved in a solvent is added to an inert polymer separator and then the separator is placed between two electrodes, after which the electrolyte species (salt and solvent) are added. Thus, a polymer precursor solution containing solvent(s), salt(s) and a polymer (three together) is not heated and then incorporated into the cell in the method of Eschbach.

It is important to point out the Hoshi and Kejha are directed toward gelled polymer electrolytes that perform as both the separator and the electrolyte (no separate separator is required). However, the instant claims require the cell be fabricated before the polymer precursor is incorporated. Thus, the instant claims require an additional separator between the anode and the cathode of the prefabricated cell in order to prevent a short circuit. One of skill

Art Unit: 1745

would not be motivated to apply the polymer mixtures of the prior art after the cell (anode/separator/cathode) has been fabricated because the gelled polymer electrolyte would not be able to serve the function of both separator and electrolyte.

### ***Response to Arguments***

Applicant's arguments filed 7/29/03 have been fully considered but they are not persuasive.

Applicant argues the method of the '084 and '511 patents uses a single heating step, whereas the process limitation of the present claim 17 requires two distinct and separate heating steps. However, claim 17 is a product claim and the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious (see MPEP 2113). Applicant asserts the method of the '084 and '511 patents "can lead to destruction of the cell during the manufacturing process". However, this assertion does not provide evidence of unexpected results. In order to overcome the 35 U.S.C. 103(a) rejection in view of the '084 and '511 patents, Applicant is required to submit a declaration providing evidence that the claimed invention has unexpected results over the prior art of record.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

Art Unit: 1745

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

September 5, 2003

  
Patrick Ryan  
Supervisory Patent Examiner  
Technology Center 1700